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ABSTRACT

Research regarding the establishment of learned reinforcement with mildly retarded children is reviewed. Noted are findings which indicate that educable retarded students, possibly due to cultural differences, are less responsive to social rewards than either nonretarded or more severely retarded children. Characteristics of primary and secondary reinforcers are described, and learning theories relevant to motivation are evaluated for their potential in changing mildly retarded students' reinforcement systems. Considered are procedures for establishing reinforcement based on three categories of learning theory: contiguity theory (including operant conditioning), cognitive theory, and exposure theory (including drive theory). Proposed is an integrated theory of reinforcement which incorporates principles from existing theories. (CL)

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IMRID Behavioral Science Monograph No. 24

THE ESTABLISHMENT OF LEARNED REINFORCERS IN MILDLY RETARDED CHILDREN

by

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1973

"Please—tame me!" he said.

"I want to, very much," the little prince replied. "But I have not much time. I have friends to discover, and a great many things to understand."

"One only understands the things that one tames," said the fox. "Men have no more time to understand anything. They buy things all ready made at the shops. But there is no shop anywhere where one can buy friendship, and so men have no friends any more. If you want a friend, tame me . . ."

"What must I do, to tame you?" asked the little prince.

"You must be very patient," replied the fox. "First you will sit down at a little distance from me—like that—in the grass. I shall look at you out of the corner of my eye, and you will say nothing. Words are the source of misunderstandings. But you will sit a little closer to me, every day . . ."

The next day the little prince came back.

"It would have been better to come back at the same hour," said the fox. "If, for example, you come at four o'clock in the afternoon, then at three o'clock I shall begin to be happy. I shall feel happier and happier as the hour advances. At four o'clock, I shall already be worrying and jumping about. I shall show you how happy I am! But if you come at just any time, I shall never know at what hour my heart is to be ready to greet you . . . One must observe the proper rites . . ."

Antoine de Saint Exupery, The Little Prince, 1943.

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Introduction

The largest proportion of mentally retarded children fall in the mildly mentally retarded range. These children are particularly puzzling to educators and psychologists, because most of them do not show evidence of brain-damage (Jensen, 1969; Zigler, 1968). Their most consistant characteristic is academic failure (Davis & Demos, 1969). Mildly retarded children as a group come from low-income families with little education (Albizu-Miranda & Matlin, 1968; Richardson, 1968; Stine, Saratsiotis, & Furns, 1969; and Wortis, 1970).

The psychological research regarding this group of children has usually attributed their academic failures to some sort of 'cultural deprivation', which has led to a multitude of special projects aimed at making up for the 'deprivation' with 'enrichment.' The majority of these special projects have used changes in psychometric intelligence as their primary criterion of success and have failed to increase the children's IQ scores by more than the standard error of measurement of the test (Howard & Plant, 1967; Jedrysek, Rosenblatt, & Wortis, 1968; Jensen, 1969; and McBroom, 1969).

The correlation of academic failure and mental retardation with social class has been repeatedly documented, but researchers such as Sigel and Perry (1968) have looked at 'culturally deprived' Negro children as a group and found that they demonstrated a wide range of ability and competence (in the 3- to 6-year-old range). As claimed by Jane Mercer (1961), these children do not appear to be mentally retarded outside of the academic setting.

The deprivation hypothesis on which most research with the mildly mentally retarded has been based has proven unsuccessful in providing any useful intervention for them. Jensen's (1969) genetic hypothesis is unacceptable to most psychologists and educators primarily because it is pessimistic about the possibility of remedy for the educational problems of this group. Jensen's hypothesis also totally neglects, as does Mercer's, the factors of motivation, defined in operant terms as the reinforcers to which the children are susceptible. The aim of this paper is to investigate the possibility that most mildly retarded children suffer neither from a foreign culture nor from defective genetic make-up. The problem peculiar to mildly retarded children from backgrounds of low socio-economic status may rather be one of motivation. By this is ment that their reinforcement systems are different from other children and that this is the primary cause of their school problems. The child-rearing practices of families of deprived children may be inadequate in preparing them to perform school tasks for the reinforcers offered by the teachers in our schools. Within the literature on the problems of educable mentally retarded children, motivation is consistently noted as an important factor (Bortner & Birch, 1970; Grotberg, 1970; Gruen & Zigler, 1968; Haywood, 1967; Matlin & Albizu-Miranda, 1970; Teele, 1970; and Zigler, 1968).

The reinforcement control of children in school tasks can be seen as a direct strengthening of learning (Thorndike, 1935) or as the control of choice behavior, a view similar to that of Estes (1969) and Walker (1969). The control of choice behavior is important to school

learning as long as the school relies on repeated practice of a task as a means of producing learning. It is obvious that if the practice of tasks leads to learning, that practice behavior must be controlled by the teacher, and a child who cannot respond to the reinforcements offered by the teacher cannot be kept at his school tasks, regardless of his desire or ability to learn.

Lindsley (1965) is convinced that most individuals with whom society cannot adequately deal, especially the mentally retarded, have failed to develop susceptibility to the same reinforcers (e. g. social praise) that non-retarded individuals have, and these individuals could be successfully trained if we could develop appropriate reinforcers for them. This point of view implies that we should adapt our system to the problems of the mentally retarded. While this strategy should give some measure of success, and must be followed to some extent in individualizing instruction for greater effectiveness, it would not be possible to change the entire society for which school is preparing these children. Although this would be the most humane, the most practical and easiest solution is to change the reinforcement system of the child to match that of society, or society will lack control over that individual and label him as abnormal or deviant, and cut him off from interaction and from his rights in society.

Social Reinforcement: The Tool of Educators.

The reinforcer which is most appropriate and useful in the school situation is verbal social approval. Aside from the obvious advantages of efficiency of administration, this reinforcer is most likely to be

seen as appropriate to a teacher in our society. It is common to hear educators who are not avid behavior modifiers (and this is the majority) refer to 'bribery' when the subject of rewarding children with tangible reinforcers (e. g. candy or toys) is broached. Although they do not usually think of social approval as a reinforcer, this is the control most commonly used by teachers in our schools. If any child comes to school unprepared to be reinforced by social approval from teachers, the child will not be prepared for school at all, because the teacher lacks an important control over his behavior.

The incidence of token economies, employing tangible reinforcers, is not common in regular classrooms, where mildly mentally retarded children might otherwise fit in. The mildly retarded child must be prepared to work for extant reinforcers in the regular classroom.

Level of Mental Retardation and Reinforcement

According to the hypothesis that motivational deficits in the educable mentally retarded are of primary import to their education and that these deficits are due to a different reinforcement hierarchy for the mentally retarded than the average student, one would expect that the reinforcement literature would reflect a difference in the rewards to which retarded and nonretarded children respond. In general, the literature tends to show that moderately and severely retarded children do respond to positive social rewards more often than do mildly retarded children. Barrett (1969) reports that praise was used successfully to toilet train a 5 1/2-year-old child functioning at a 'very low level.' Monaco (1968) reported that appropriate behaviors were successfully

brought under control in 12 severely mentally retarded children (CA 8 to 12 years) using positive verbal reinforcement on a continuous and intermittent schedules. Hamilton and Allen (1967) reported that they were able to control toothbrushing, mealtime behavior, and the self-administration of medicine in 59 institutionalized severely mentally retarded subjects using verbal praise and time-out procedures. Hopkins (1968) demonstrated the control of candy over the smiling behavior of 2 institutionalized mentally retarded children, but found that social interactions were sufficient to maintain the behavior. Candy and food have also been used successfully to train 71 trainable mentally retarded girls (IQ 25 to 55) (Lent, 1968). The relative number of behavior-modification studies which achieve reinforcement control of children below the educable mentally retarded level with social reinforcers is surprisingly large compared to the number succeeding with educable mentally retarded children.

The same effects have been observed in children labeled autistic. Brawley, Harris, Allen, and Peterson (1969) reported social reinforcers successfully accelerated correct verbalizations, use of play materials, and use of discrimination tasks in preparation for reading, in a 7-year-old autistic boy. Similarly, Dodge and Harris (1969) reported success in controlling the behavior of a 7 1/2-year-old autistic boy using systematic adult social praise and food. McConnel (1967) found it necessary to reinforce a social behavior (eye contact) of a 5 1/2-year-old Negro autistic boy from a low-socioeconomic-status background. Boys labeled autistic have also been found to show deprivation effects

when isolated from stimulation and social reinforcers. Schechter, Shurley, Toussieng, and Maier, (1969) placed 3 autistic boys in isolation, with very little sensory stimulation or variety. They found the children calm and happy during the 40- to 74-day periods, and the boys sought human social contact for the first time in their lives following this experience.

The above research, involving children most likely to have a normal family and to have suffered some brain damage, demonstrates how researchers find it feasible to use social reinforcers as the independent variable at more severe levels of mental retardation. Social praise is used as a reward, and the problem is not seen as one of establishing social reinforcers for most children below the educable-mentally-retarded level. For the educable mentally retarded themselves, however, there are many more studies which use social praise and social interaction as a dependent variable—to be increased as a behavior of the child, rather than used as a reward for him.

Solomon (1968) showed that institutionalized mentally retarded children (Mean IQ=60) outperformed noninstitutionalized educable mentally retarded children (Mean IQ=69) on physical, gymnastic tasks, when the reward was continuous verbal encouragement combined with material reward. Social training has been the dependent variable in much research. Ross (1969) "taught social responsiveness" to educable mentally retarded children within a practical, 'syllogism framework', using doll play, live models, film slides, and puppets, over a two-month period. Hart and Risley (1968) found that, for 15 disadvantaged

preschool children, their rates of using descriptive adjectives could not be controlled by teacher praise or social and intellectual stimulation, nor was the time spent in school related to the rate. However, significant increases in usage occurred when rewards were access to preschool play materials, snacks, and toys.

Token economies usually use tangible (as opposed to social) reinforcements and are expected to be more appropriate for the deprived and/or mildly retarded child. Ray (1968) used tangible goods and services to improve the self-help skills and behavior problems of disturbed mentally retarded adolescents. Shelton (168) similarly used a token economy to improve the personal hygiene, eating habits, and social behavior (again the dependent variable) of 40 institutionalized boys (IQ's ranged from 40 to 70). A token economy has even been reported to have changed the mean IQ of a group of 12 educable mentally retarded children from 67 to 80 over a school year (Sachs, 1971).

Steinman (1968) used a contiguity strategy in pairing verbal approval with preferred material rewards for 5 mentally retarded children (CA ranged from 10 to 14 years, with a mean IQ of 77), using a 5-stage, decreasing schedule. Schell and Adams (1968) found increased social responsiveness in autistic children as a result of training parents in operant methodology. Butterfield and McIntyre (1969) found that two types of punishment facilitated the concept-switching performance of mentally retarded subjects.

Other studies have shown a similar tendency on the part of educable mentally retarded subjects to blame themselves for failure and to

expect failure. MacMillan (1969) interrupted subjects on a task and found that the educable mentally retarded blamed themselves for not completing the task, whereas the normal subjects did not. He obtained the same results in a later replication (1971), as Belok (1969). That this problem is directly related to vocational success is demonstrated in the research of Burke (1968) in which those educable retarded adolescents with the lowest 'self-concept' (on the Worker Scale) had serious work problems, while the corresponding highest-scoring subjects were doing an outstanding job. Although it must be considered that job problems and failures could have affected 'self-concept', this situation parallels Katz's (1967) research in which self-blame was applied in an ambiguous situation. It is more likely that the poor 'self-concept' preceeded the poor job performance and is involved in its cause.

Neuhaus (1967) found in a 3-year study of 29 educable retarded subjects (CA ranged from 17 to 30 years, IQ ranged from 60 to 80), that 60% were average or above in work performance, but the most important aspect was not learning job skills, but the mildly retarded person's ability to adjust and work well with his fellow employees. As students, too, the educable mentally retarded have been found to be less accepted in regular classes by non-retarded students and were as low in the social structure in academic as in non-academic classes, but the more popular students in special classes were more accepted in regular classes (Rucker, 1968).

The use of responsiveness to verbal reinforcers as a dependent

variable for children in the educable mentally retarded range supports the expectation of a motivational deficit. Children in this range have failed to respond to positive verbal rewards from teachers, leaving them outside of the usual school procedure of reinforcing repeated practice of a task by social reinforcers. That the teachers are aware of this problem is reflected by the research of Schmidt and Nelson (1969), in which 80 teachers of educable mentally retarded students (grades 7 through 12) in Southern California were surveyed to determine the goals of their special education classes—special class teachers considered personal and social adjustment to be the dominant goal in their methods rather than the acquisition of academic subject matter.

A survey of the contingencies offered to educable- and severely-mentally retarded subjects in published research, and the results obtained, tends to support the hypothesis that the behavior of the educable mentally retarded as a group are reinforced by tangible but not social contingencies. Tables 1 and 2 show the number of published studies in which the subjects and rewards offered could be clearly classified. These represent the 207 articles published in the American Journal of Mental Deficiency during 1970 and 1972. Only those articles which clearly dealt with a distinctly specified group and did not mix rewards are included. No consideration was given to the aspect of behavior under study. The research dealt with all of the various tasks on which the mentally retarded are tested in the literature.

As Table 1 shows, 24 studies looking for deficits offered no reward; 16 of these studies found deficits of various kinds, and 8 did

Table 1

Number of Published Studies Involving Educable Mentally Retarded Subjects, Showing Contingency Offered and Results Obtained*

Contingency Offered	Results of Studies			
	Deficit Found	No Deficit Found	Significant Change Produced	No Change Produced
None	16	8	5	4
Social	4	0	0	3
Tangible	0	7	9	0

*Appearing in American Journal of Mental Deficiency, 1970 and 1972.

Table 2

Number of Published Studies Involving Severely Mentally Retarded Subjects, Showing Contingency Offered and Results Obtained*

Contingency Offered	Results of Studies			
	Deficit Found	No Deficit Found	Significant Change Produced	No Change Produced
None	1	0	4	0
Social	0	0	6	0
Tangible	1	1	3	0

*Appearing in American Journal of Mental Deficiency, 1970 and 1972.

not. All of the 4 studies offering social rewards found the educable mentally retarded subjects to have a deficit, but none of the 7 offering tangible rewards showed a deficit for the educable mentally retarded. Among those studies seeking to produce a change in educable mentally retarded subjects, 5 of the 9 offering no reward succeeded in producing a change. All 3 of the studies offering social rewards failed to produce a change, and all 9 offering tangible rewards succeeded in producing some change in educable mentally retarded subjects.

Table 2 shows few studies dealing with the more severely mentally retarded. Although there is not enough published research on their deficits to reach any conclusion, all of the 13 studies seeking to produce a change succeeded, regardless of the reward offered.

The research literature reflected in Tables 1 and 2 tends to substantiate the hypothesis that the educable mentally retarded differ from both non-retarded and more severely mentally retarded individuals in being unresponsive to social rewards. It also implies that when the appropriate reward is offered, less deficit is found and more significant change is produced, even in carefully controlled laboratory research. The reason for this difference in reinforcement hierarchy may be that the mildly retarded, more than any other group, come from culturally different (deprived) backgrounds where social rewards are not presented or learned in the same way they are in other groups. The normal and severely mentally retarded are more likely to have middle-class backgrounds in which the social learning more closely matches that of the schools which they will attend.

The Solution: Learning and reinforcement theories.

The procedures for changing the reinforcement system of an individual have already been spelled out in the literature. Operant psychology specifically recommends one single contiguity strategy, which we must examine in terms of our needs. Other strategies have also been proposed based on theories of reinforcement and learning. Each theory has some validity based on its successful treatment of specific phenomena. Our task is to evaluate these procedures in terms of the needs of the mildly mentally retarded for changing their reinforcement systems and to select the procedures most likely to provide us with relatively powerful social reinforcers.

The learning theories relevant to motivation will be dealt with in three broad categories: Contiguity theory (including operant psychology), Cognitive theory, and Exposure theory (including Adaptation Level theory). Each of these learning theories is relevant to the problem of how a stimulus (in this case, social praise) must be exposed to an individual in order for that stimulus to become a reinforcer to him.

The procedures for establishing social reinforcers stemming from each theoretical context are examined in light of research findings, and it is evident that no single theoretical position is adequate for establishing social reinforcers. Because each theory has had some success in dealing with specific phenomena, and consequently has some degree of validity, they cannot be scrapped in favor of a totally new theory. Any theory adequate to deal with social reinforcement must

have something in common with each of these major learning theories. Is is proposed that a theoretical framework could be built which incorporates principles from most of the existing theories and deals better with the problem of acquiring social reinforcers. This integrated theory is presented along with procedures that follow from it for establishing social reinforcers and relevant research with the mentally retarded which fits an integrated theory in spite of the fact that none of the research was conducted on the basis of that theory.

Characteristics of Reinforcers

The first problem in establishing reinforcers is to define exactly what is meant by the term. In the current research literature, social reinforcement is consistently referred to as 'secondary reinforcement', but no exact definition of secondary reinforcement is universally accepted.

Primary and Secondary Reinforcers.

Catania (1968) defines a primary reinforcer as, ". . . a reinforcer the effectiveness of which does not depend on its having consistently preceeded some other reinforcer." (p. 342). A conditioned reinforcer is defined by Catania (p. 330) as, ". . . a stimulus that has become effective as a reinforcer because it has consistently preceeded another reinforcer. Such stimuli have also been called secondary reinforcers, but . . ." secondary should mean that it occurs immediately before the primary, etc. Skinner (1953, p. 78) implies that the conditioned reinforcer must be paired with a primary reinforcer.

Catania's definitions imply that all reinforcers which are not primary or unlearned have gained their power to reinforce by the specific procedure of pairing the event to become a reinforcer with an event known to be a reinforcer. This points to the reliance of the field of behavior modification on the pairing strategy as the one and only means by which an event can become a reinforcer. Consequently, if it could be shown that an event gains the power to reinforce by any procedure other than contiguous pairing with a known reinforcer, then that event must be defined as a primary reinforcer. Further, if it could be shown that all learned reinforcers gained their power to reinforce by arrangements other than the pairing procedure, then all learned reinforcers would be primary, and the distinction would be meaningless. One goal of this inquiry into reinforcement, then, involves finding alternative methods of establishing secondary reinforcers, which will in turn serve to further muddy the distinction between primary and secondary reinforcers.

Secondary reinforcers may be established according to principles of learning theory (other than contiguity), more or less resistant to extinction than contiguously established secondary reinforcers, subject to deprivation and satiation effects, and more or less powerful than contiguous secondary reinforcers. The secondary reinforcer would still exist, but other alternative forms of learned secondary reinforcers could also exist with different characteristics.

Characteristics of Primary Reinforcers.

Primary reinforcers have been distinguished from secondary

reinforcers in our literature primarily as having not been conditioned or learned. Catania's (1968) definition seems to distinguish between them until we recall that we almost never know the previous reinforcement (and learning) history of an organism. The effect of the environment upon those reinforcers previously held to be primary is all too evident when we consider food preferences, sex practices, and other variations of these primary reinforcers which are affected by the environment and learning.

To be sure, all living species have in common the activities involved in consuming primary reinforcers, but any individual at a particular point in time may very well not respond to any one of them. Although it has been demonstrated that deprivation of a positive 'primary' reinforcer may increase its power to reinforce (increase responding for it), there are complixities of human behavior in which food and sex are voluntarily forgone (e. g. fasting, celibacy, or giving food to a hungry person in spite of one's own hunger). A human who has (presumably) learned to behave in this manner often eats only when it is necessary to maintain his life and sometimes never participates in the reproduction of his species. Thus, not only can the quality of a person's response to a presumed primary reinforcer be influenced by learning, but also the power of that reinforcer can be drastically charged.

At the same time, it cannot be argued that the primary reinforcers necessarily arise from biological 'needs', since the influence of learning on these responses is also compelling in this argument. Further,

many biological needs (e. g. for vitamins or minerals) do not give rise to reinforcers which would reduce the deprivation of that needed substance.

Characteristics of Learned Reinforcers.

With the assumption that all learned reinforcers are secondary reinforcers comes debate over what the characteristics of these secondary reinforcers should be. Gewirtz and Baer (1958) contend that social reinforcers, which are assumed to be (learned) secondary reinforcers, are, indeed, subject to deprivation-satiation effects. Besides being subject to deprivation effects, social reinforcers are permanent (do not loose their power when primary reinforcers are removed), and sometimes appear to be more powerful than primary reinforcers. The characteristic of being established by a different procedure may also be considered.

Agreeing with Skinner that social approval is a 'conditioned reinforcer,' Gewirtz and Baer (1958) have conducted studies with children in which they are deprived of social reinforcers for a time period immediately preceeding their performance on a task for which social approval (praise) was given contingent on performance. They have consistently found that children who receive no social reinforcers before the task are affected significantly more by social reinforcers during the task in their choice of responses. These results are contrary to what would be expected from a secondary reinforcer.

We must consider the possibility that social reinforcers are secondary reinforcers which are not established as described by Catania (1968).

It is possible that many secondary reinforcers do not have the same characteristics, and, indeed, are not the same kind of reinforcers at all. These secondary reinforcers might very well be a different class of events entirely, not only relatively permanent and subject to deprivation and satiation effects, but also established in a manner different from other secondary reinforcers.

The term 'secondary reinforcement' in the current literature includes practically all effective reinforcers, with the exception of a few primary reinforcers. The variety and distinction in the field comes in the form of theories about reinforcement and in the experimental procedures for testing the effects of reinforcers, but secondary reinforcers are not distinguished from each other in terms of their relevant characteristics: How they are established, their relative permanence, their independence from primary reinforcers, or their power. The search for a single theory which explains all learned reinforcement has resulted in a great deal of disagreement, profusion of mutually exclusive theories, and frustration among the scientists themselves.

> There is no concept in all of psychology that is in such a state of theoretical disarray as the concept of secondary reinforcement. We know that there are secondary reinforcers because we know that the bulk of human behavior is learned by means of socially instilled rewards and punishments. But we know essentially nothing about how this instilling is done. The attempts to conduct systematic laboratory investigations to disclose how secondary reinforcers are established have as often as not failed to obtain any effects at all, much less show how they depend upon experimental parameters. (Bolles, 1972, p. 13).

For an explanation of how a stimulus event in general (and social reinforcers in particular) becomes a reinforcer to an individual, evidence may be found in learning theories. The learning theories which

deal with relatively permanent changes in an organism have been classified into three categories in terms of their strategy of exposure of a stimulus (in order for learning to take place): Contiguity strategy, Exposure strategy, and Cognitive strategy. To the extent that these strategies are successful in affecting changes (learning) in the organism, they should also be able to affect the reward function and power of potentially reinforcing stimuli.

Theories of the Establishment of Reinforcers

Various theories of learning have developed to explain the way in which reinforcers operate, and these theories have implied different operational procedures for establishing reinforcers.

Contiguity.

Skinner (1953) proposed that social reinforcers gain their power to reinforce by virtue of having been paired with primary reinforcers repeatedly. This is the procedure of building or instituting secondary reinforcers which extinguish rapidly in the laboratory (Kelleher & Gollub, 1962; Razran, 1955). These secondary reinforcers are less powerful than the primary reinforcer in the laboratory, and are not independent of primary reinforcement even after establishment. Kelleher and Gollub proposed that the power and independence of a secondary reinforcer could be enhanced by multiple pairing with different primary reinforcers. This is the same as Skinner's (1953) 'generalized reinforcer."

Contiguity strategy and mild mental retardation. If children from culturally deprived backgrounds are actually less susceptible to social

reinforcers, contiguity theory would explain this as a failure of pairing social reinforcers with primary reinforcers. The solution would be to expose the children to social praise paired with primary reinforcers. Studies have been conducted which attempted to do exactly this.

Current research literature. The research being conducted with mentally retarded children reflects the theoretical bias of operant technology, but it does not reflect a technology which can, at will, institute social reinforcers. 'Social behavior' is sometimes treated as a dependent variable—rewarded, increased, then observed to decrease when rewards are withdrawn (Redd, 1969; Whitman, Mercurio, & Caponigri, 1970). At other times the social behavior itself is the independent variable and is the reward which is withheld, deprived of, then presented in a contingent relationship (Gewirtz, 1958; Mosley, 1971; Redd, 1969).

The real task, and apparently the most difficult, is to take mentally retarded children who demonstrably respond primarily to negative social incentives (Sternlicht, Bialer, & Deutsch, 1970) and change their reinforcement hierarchy in such a way that positive social incentives become reinforcing. Contiguity (pairing) strategies have had mixed success with establishing social reinforcers. Steinman's (1968) pairing of social reinforcers with preferred material rewards is complicated by length of exposure (in his 5-stage training) and cognitive strategy (the verbal reinforcer served as a discriminative stimulus for a new response reinforced on a decreasing percentage schedule). Birnbaur (1968) established the fact that electric shock was an

effective negative reinforcer for a 14-year-old severely mentally retarded boy, but when the word 'no' was paired with the electric shock repeatedly, it did not gain any power to control behavior, nor did pairing 'no' with time-outs.

Cognitive Theory.

Cognitive mediation theory purports to explain the acquisition of reinforcers by significantly disposing of the contiguity strategy and relying on (cognitively) understood contingency. According to cognitive mediation theory, a person wants positive evaluations because he can foresee that they are likely to be followed by positive primary reinforcers and dislikes negative evaluations because he expects them to be followed by pain or frustration (Hill, 1968). This process depends on the person's rational ability to see relationships. Longstreth (1971) contends that attempts to demonstrate secondary reinforcement in humans (by contiguity strategy) have not worked; an operant psychologist assumes,

> ...that social approval, having been paired with established reinforcers many times in the child's past, and now presented systematically after episodes of good behavior, secondarily reinforces such behavior and maintains it at a high level of frequency. (p. 56)

This is a description of a conditioned reinforcer which has the power, in and of itself, because of previous pairings, to reinforce behavior, but Longstreth disagrees,

> We say no. The reason Johnny behaved so well was because he had a plan. The plan was that he intended to ask his parents if he could stay up late and watch a special program on TV. His strategy was that, if his parents were in a "good mood" after dinner, they would be much more likely to grant his

> request. He therefore behaved in a way calculated to instill the good mood. Social approval from his parents was merely an index of mood state; the greater the frequency of social approval, the better their mood. Thus he behaved in such a way as to maximize the frequency of social approval from his parents. Tomorrow would be another day, and there perhaps would be no special plans for the evening. Johnny perhaps would not come in so promptly for dinner either. (p. 57)

Longstreth's own description of the function of secondary reinforcement does not assume that the reward (social approval) has gained reinforcing power, in and of itself, to strengthen behavior—he ascribes that belief to the "S^r psychologist"--but makes the problem one of discrimination. The question whether a secondary reinforcer can reinforce by itself is bandied about and ascribed to others as a disadvantage of their theory, but, as Bolles points out, it has not been answered. Note that in Longstreth's description social approval was apparently reinforced by TV. Although TV as a sensory stimulation or as novelty might be considered unconditioned reinforcement, the process by which this "special" TV program gained its power as a reinforcer of social behavior is not explained.

Characteristics of cognitive reinforcers. Cognitive reinforcers must be the least permanent of all learned reinforcers considered. Regardless of the number of pairings or repetitions, a cognitively established reinforcer would loose its power the moment an individual understands or learns that the contingency has changed.

Cognitive reinforcers have no power in and of themselves. Their power depends directly upon the power of the reward to which they give access. The power of social approval must depend, as in Longstreth's description, on the rewards it is understood by the individual to stand

for, or lead to.

Cognitive theory and mental retardation. Since cognitive mediation theory depends on the understanding of contingent arrangements to give meaning to acquired reinforcers, the mentally retarded would not be expected to develop learned reinforcers because of their presumed intellectual deficits. From this point of view, normal environments could not engender the same reinforcement control in children with subnormal intelligence that they could in normal children. The conclusion is that this control cannot be developed because of the intellectual deficiency of the deprived individuals or that the contingencies offered by the environment must be made explicit and pointed out to them. In the latter case, the effects of learned reinforcers would be the same as for non-retarded individuals—they would work to the extent that they were understood.

The cognitive strategy of establishing a reinforcer, by verbally describing its contingent value to the child would be expected to have limited utility because of the cognitive deficit generally ascribed to the mentally retarded (Miller, 1970). There is some reason to believe, however, that verbally ascribed value can make foriegn words more powerful social reinforcers to mentally retarded subjects than common words of social praise (Cairns & Paris, 1971). This could be especially true of the mildly retarded, where motivational, rather than cognitive deficits, may be more important (Zigler, 1966). Edmonson, Leland, and Leach (1968) are convinced that an educational approach to social skills has resulted in increased social responsiveness and

relationships in 271 adolescent educable mentally retarded subjects. Since the approach was instructional, aimed at correcting what they saw as an interpretive deficit in the educable retarded, it would fit as a cognitive, verbal approach, and the increased social responsiveness should indicate increased power of social reinforcers for these persons. This study could not, however, clearly demonstrate a solely cognitive approach, since exposure and possible contiguous pairing with other reinforcers took place. Ross (1969) also used an instructional program and obtained the same results.

Cue function and secondary reinforcement. Schuster (1969) contends that the process of pairing a neutral stimulus with a primary stimulus is not useful unless the neutral stimulus serves as a cue for primary reinforcement. In his 'functional analysis' of conditioned reinforcement, he concludes from his laboratory research with chained and concurrent schedules using pigeons, that, "When an arbitrary stimulus is programmed to follow a response, the effects of that stimulus on responding are a function of the conditions of primary reinforcement being cued by the stimulus." (p. 231) This approach has in common with the cognitive approach that contingency is much more important than contiguity.

> Moreover, to acquire discriminative control or cue function, it does not seem to matter whether this stimulus is merely paired, in Pavlovian fashion, with a set of reinforcement conditions, or is used as a discriminative stimulus for those conditions. Only the cued parameters of reinforcement seem to matter. (p. 232)

Sheer contiguity between a stimulus and reinforcement is not a sufficient explanation of conditioned reinforcement. Schuster presents

five experiments in which he showed that: (1) a concurrent schedule (in which the subject can choose a response key programmed with one schedule or another key programmed with a different schedule of reinforcement) for presenting an "arbitrary" stimulus produced a sustained increase over the rate produced by primary reinforcement alone, (2) with continued exposure, on a choice measure, the schedule including the neutral stimulus paired with the primary reinforcement was at first chosen more than the same schedule with only primary reinforcement, but (3) after continued exposure to the schedule with the paired neutral stimulus, it was actively avoided by 7 of 9 birds, and (4) when the arbitrary stimulus was presented but not paired with the primary reinforcer (as one choice), there was no effect of the arbitrary stimulus on response rate or choice.

Schuster found that adding an arbitrary stimulus paired with a primary reinforcer produced initial preference for the arrangement, then aversion to it, without ever dropping the primary reinforcer. This result showed that continued pairings do not sustain the reinforcing strength of an arbitrary stimulus, as was tested by the use of concurrent schedules, but a chain schedule can sustain reinforcementlike effects on both response rate and choice behavior. "This difference in effects seems to be due to the different cue functions of the conditioned reinforcing stimulus in the two methods." (p. 221)

> If we include the Extinction method of conditioned reinforcement in which the long-term behavioral effect is loss of responding, it is possible to conclude that an arbitrary stimulus cannot produce a sustained reinforcementlike effect when it is not a cue for primary reinforcement.

Schneider (1972) has confirmed Schuster in finding that,

> Whether or not the terminal-link interreinforcement intervals were the same on the two keys, initial-link responding was affected by neither the presence nor relative durations of differentially signaled components within a terminal-link schedule . . . . The present findings imply that relative choice is directly governed by the intervals to primary reinforcement associated with the terminal-link schedules . . . . The present results lend additional support to the view that stimuli often presumed to act as conditioned reinforcers may in fact exert their effects on behavior through non-reinforcing functions.

This cue interpretation implies that many secondary reinforcement effects observed in the laboratory are not cases where the power to reinforce is imparted to a neutral stimulus by repeatedly pairing it with a primary reinforcer. The presumed secondary reinforcement is simply a cue which tells the animal that primary reinforcement is forthcoming or will be delayed, and it is this information which influences responding to the secondary reinforcement in ways observed in the laboratory.

In order for this cue function to be useful in place of a concept of acquired or conditioned reinforcement, there are other phenomena for which it must account—celibacy and fasting are examples. Presumably the practices of forgoing food or sex voluntarily are performed so that something else may be obtained (e. g. visions, inspiration, the freedom to concentrate on some particular work, etc.). The other activity or goal becoming more probable than 'primary' reinforcers should, in turn, be defined as a reinforcer itself.

In cognitive terms, for cues that signal primary reinforcers to become this powerful, the chains would have to become long and complex

enough to confuse logic, so that the organism looses sight of the 'real' goal (the primary reinforcer) to the extent of actually rejecting or avoiding it in favor of a learned conditioned reinforcer. Or, some process must exist by which an acquired reinforcer can become as powerful as or more powerful than a 'primary' reinforcer. Although cognitive acquisition, such as cue function, does appear to establish responding to a cue as a reinforcer, it does not adequately explain the further step of becoming so powerful that the reinforcer to which it was supposed to lead may become unnecessary. We would expect that the original reinforcer could be removed without producing extinction of responding to the cue. We must consider that the cue can become an acquired reinforcer itself, rather than just a signal for food and that there may be other processes, such as contiguity or adaptation, which are relevant to this process.

Establishment of a secondary reinforcer. Since Schuster (1969) and Schneider (1972) have contended that pairing is not the key to making a neutral stimulus reinforcing, we must consider whether serving as a cue could be only the first step in the process of imparting reinforcing power to a stimulus. Bolles (p. 372) concludes that, "Secondary reinforcers are merely stimuli that hold together chains of behavior." The discriminative and reward functions of secondary reinforcement have become so confused that Wike (1969, p. 68) wonders whether it is not futile to try to distinguish these functions.

The Premack Principle.

Premack (1965) has advanced the theory that the probabilities of responses determine their relative reward value. In an environment where different activities and events are available, the time spent in a particular behavior (or in a consumatory response to an event) can be compared to the time the organism spends engaged in another behavior. The more probable behavioral event will be an effective positive reinforcer for a less probable behavior when the more probable is made contingent on the less probable (the time spent engaged in the less probable behavior will increase). If the contingency is reversed, and the less probable event made (or forced to be) the consequence of the more probable, the less probable event will act as a negative reinforcer for the more probable (time engaged in it will decrease). Premack has demonstrated these effects on the eating, drinking, and running behaviors of rats, and for this reason contends that the distinction between primary and secondary (or conditioned) reinforcers is artificial.

Katz (1967) has researched Negro children's self-evaluative behavior (pressing a "good" green-lighted button, an "don't know" yellow, or a "poor" red) in a private setting (where no one could see the button pressed), on an ambiguous task (assembling a puzzle-picture). He found that the proficiency displayed on the puzzle assembly did not differ between academically successful and unsuccessful students; but among the boys the academically successful pressed the "good" green-lighted button at a significantly higher rate, and the academically

poor boys pressed the "poor" red-lighted button significantly more. Katz concluded that the boys who were poorer academically had higher standards and were consequently more self-critical when the degree of success was uncertain. "The data suggest that in the absence of external cues they had difficulty accepting their own performance as adequate." (p. 164).

Katz interprets the results in terms of (Areofreed's 1969) anxiety reduction model, in which once a child has had some contact with punishment for a particular type of behavior, he will experience anticipatory anxiety in the intervals which occur between subsequent enactments of such behavior and the occurrence of punishment. The punishment, when it finally comes, then reduces the anticipatory anxiety. Self-criticism, which is under his own control, comes to reduce this anxiety.

Premack's principle, regarding the relative probabilities of responses, would lead one to suspect that the "poor" button, and possibly critical evaluations of his work, were not punishers to the child. In fact, his choice of the "poor" over the "good" button in an ambiguous task is simply an indication of its higher response probability, implying that it would be more likely to function as a reward in relation to a less probable behavior.

Premack (1971) contends that stimulus events in the environment usually considered neutral are actually assigned some 'value' on a bi-polar scale common to all stimulus events when they are encountered. This process has much in common with cognitive theory, in that contiguity

is not involved, but contingency (or cognitively understood contingency) may be.

Premack reported that unpublished research by Benson shows that children who are 'backward' in school consistently show less preference among 'neutral' or 'inconsequential' objects when asked to choose which they like better. Since Premack contends that all responses to stimulus events in the environment can be ordered on a bi-polar scale of "value," and subtle differences in the values of events can control behavior, he concludes that many individuals are less susceptible to control by reinforcement because fewer reinforcers are available for them.

If mildly mentally retarded are among the 'backward' children who show little preference among stimulus events in terms of their potential reinforcement value, then reinforcement of their behavior should be a greater problem than among the non-retarded. Although they could be controlled by powerful primary reinforcers, when the behavior modifier attempted to 'fade' his reinforcers to more natural, environmental contingencies, he would find that fewer potential reinforcers exist in the environment for the mentally retarded because of their failure to assign values to the subtle stimulus events in the environment. The solution to this problem might be a cognitive one--that the contingencies, or 'value' of events in the environment must be made explicit and pointed out to them.

If Premack considered the results of Katz's (1967) research, one would expect a different explanation of the results--simply that the

self-critical comments or evaluations of the poor students were more probable than self-praise. Consequently, it appears that Premack would expect self-critical evaluation (and possibly critical evaluations from others) to be more positively reinforcing than praise for the poor student in general. A child who reacted in this way to praise offered in school for desired behaviors would do particularly poorly in our system. Premack does not claim to be able to explain the establishment of secondary reinforcers, but if criticism is a positive reinforcer and praise is not for poor students, the explanation of such an arrangement would be particularly difficult in reinforcement terms. Contiguity theory must propose that in order to have these results, the child must have experienced critical comments repeatedly paired with some positive reinforcer. This kind of arrangement is conceivable but seems very unlikely. Cognitive theory would lead one to expect that the criticism was a cue to some positive reinforcement, much like Katz's own anxiety-reduction explanation, but this should change in school when the contingency arrangement is otherwize--criticism is a cue that other 'punishment' (e. g. spanking or bad grades) is forthcoming. There is also the possible explanation that exposure itself has influenced the probability (and consequently the reinforcement value) of criticism.

Exposure theory.

Helson's (1964) Adaptation Level Theory is an exposure theory. Exposure to a stimulus establishes an internal standard (adaptation level) for that stimulus. When the amount of a stimulus in the

environment is different from the adaptation level, tension is induced in the organism, influencing the direction of choice behavior and judgments of perceptions. Helson has established that he can reliably predict judgments made about a series of stimuli by computing the weighted log mean of the series and comparing any stimulus to that mean (which corresponds to the internally established adaptation level for that series).

Drive theory. To apply adaptation-level theory to response probabilities, internal standards must be assumed to exist for all stimuli, such as the degree of hunger to which the animal is adapted. When the organism experiences more than the adaptation level, he is hungry; when it extends over a period of time he is deprived; and when it reaches the adaptation level or goes below it he is satiated. If internal standards exist for many different behaviors, or stimulus events, then the amount experienced at any particular time can be compared to the internal standard and the result will be either that he is deprived, satiated, or that he has had too much of that stimulus event. It is obvious that if the amount or intensity of a particular stimulus is very much below the adaptation level for a sufficient period of time, the animal would be expected to seek or work for an increase in the amount of that stimulus until the amount experienced reaches the adaptation level, at which point he becomes indifferent to that stimulus event.

In an important way, adaptation-level theory incorporates the principles of drive theory (Hull, 1943). Since it is the 'tension'

that is induced by the deprivation of a stimulus, there is actually only one drive. It is aroused by a situation in which stimulus events are significantly above or below the adaptation level for that stimulus class and reduced only by a return to that level. In the sense that departure from adaptation level to tension has drive-like effects, there can be as many drives as there are stimulus classes to which the organism adapts but with only one underlying vehicle, tension level.

D. E. Berlyne's (1967) theory of arousal level is similar in some respects to this concept. Berlyne favors a single-drive concept (p. 184), this single drive being 'arousal potential.' He tested the reward value of light increments as the consequence of bar presses and found that not only did the light changes increase the number of bar presses on training days and during extinction, but also that the level of arousal of the animal (from noise sources where they were housed) determined the extent to which they would press a bar for light increments. Berlyne postulated that small stimulus changes are almost always rewarding, especially at some intermediate level of arousal, at which time the stimulus change is likely to exceed the threshold for pleasure in the nervous system but not exceed the higher threshold of the aversion system. This later speculation was not conclusively tested (by his own admission) when he used phenobarbital to insure low levels of arousal in his rats, neither did he find that the degree of light increment had any effect on the number of bar presses during training or extinction. Berlyne did find that novelty of the light consequence had the effect of increasing bar presses for it, but

novelty preference gave way to preference for the familiar at high levels of arousal produced by noisy home cages or by injection of methamphetamine (Berlyne, Koenig, & Hirota, 1966).

Berlyne's statements regarding stimulus effects at low levels of arousal disagree with the adaptation-level interpretation presented here and with Hebb (1955) and Fiske and Maddi (1961), all of which predict that stimulus deprivation (and consequent change in arousal) leads to stimulus seeking when it is below some optimal level. An organism deprived of stimulation, according to the adaptation-level model, would experience increasing tension as a result of the discrepancy from adaptation level, and this tension could be reduced only by an increase in stimulation. It is possible, however, that an adaptation level could be formed separately for the amount of stimulation received at any one moment (as distinguished from the general level of arousal resulting from stimulation), so that if the momentary amount of stimulation exceeded the adaptation level for that stimulation the discrepancy would produce aversive tension.

The adaptation-level model appears to fit many phenomena observed in the environment—many stimuli seem to gain in their power to reinforce as a function of exposure. A drug addict is certainly not nearly as reinforced by his drug when he first experiences it as he is after having it for a period of time (establishing an adaptation level for it) and then having it removed. Food preferences can also be established by exposure to the food, and once established can be highly resistant to change. The seeking of novelty in the environment appears also to

follow this model—an adaptation level to novelty may be established early in life, but later it is obvious that being in a monotonous enviroment will stimulate novelty-seeking behavior in proportion to the time spent there.

Establishing reinforcers. The strategy for establishing an event as a reinforcer for an individual, according to the adaptation-level model, would be to expose the individual to that stimulus event at some frequency and intensity for a period of time (so that he forms an adaption level for it) and then removing that stimulus. Following removal he will be in an increasing state of deprivation for that stimulus as its level departs from the adaption level established.

There are problems with using this model alone, though. It is obvious that organisms do not seek to maintain every stimulus to which they have been exposed. Some additional stipulations must be made to clarify the conditions which will lead to the potentially powerful and durable acquired reinforcers which this model might establish. The question also arises how positive and negative reinforcers are established differentially, since many stimuli (e.g. electric shock) do not appear to be positive after exposure, and other (e.g. sweet taste) are universally positive.

It is possible that specific conditions are necessary during exposure of a stimulus in order for that stimulus to become a reinforcer, and long exposure would make it likely that these concomitant conditions would occur while the stimulus is present.

Behaviorists have investigated the theory that the arousal and satisfaction associated with a primary need, when paired with a neutral stimulus, will cause that neutral stimulus to take on some of the arousing properties of the situation and become a secondary reinforcer. This is the condition under which we have seen 'secondary reinforcers' are established. If contingency between the neutral stimulus and a reward is a necessary condition of exposure, then cognitive theory would be supported. Other conditions of exposure may also be considered which would lead to the establishment of the more permanent and independently powerful acquired reinforcers for which we seek.

Social reinforcement and adaptation level.

Baron (1966) has used an adaptation-level for social approval. He proposes that an internal standard for amount of social approval (SRS) is established directly by the person's history of reinforcement. This current rate of social reinforcement is automatically compared with the SRS and the results of this comparison influences task performance for social reinforcement--if the current rate is widely divergent from the SRS, the situation is aversive, the social reinforcement is ineffective, and the subject will vary his task performance so as to receive a level of social reinforcement closer to his SRS. If the divergence is slight or moderate, the social reinforcement will effectively reinforce (and increase) the task performance, particularly if it slightly exceeds the SRS. The past history of reinforcement (SRS) may be controlled

in the laboratory to a limited extent or assessed by a social reinforcement scale (Crandall, 1963), biographic history (Zigler, 1961), or school records (Crandall, 1963).

Crandall (1963) has found significant correlations between s social reinforcement questionnaires and general expectancy of success (GE), between school performance and GE, and between GE and effectiveness of present social reinforcement. Although the correlations are significant, they leave a great deal of variance unaccounted for (vary from .21 to .32).

Baron (1966) has performed laboratory research in which he socially reinforced 36 female subjects on 60 trials at rates of 100% or 33% (FR) for choosing affectively positive or negative labels for neutral pictures. He then gave 60 reinforcement trials in which each of the above conditions (100% and 33% reinforcement) was followed by 100%, 66%, or 33% reinforcement, followed by 60 extinction trials. Baron found that the conditions of moderate discrepancy (100%-66%, 33%-66%) produced a higher rate of conditioning than substantial discrepancy (100%-33%, 33%-100%). Each of the positive-discrepancy treatments produced a higher rate of conditioning than did negative-discrepancy treatments of 'equal magnitude'. Substantial discrepancy produced more negative affect, as measured by GE during and interviews following the experiment.

Helson has found that the first stimulus experienced in a series or one set off from the others must be weighted more heavily in the weighted log mean formula. This implies that the first or

earliest experiences with a stimulus are the most important in establishing the adaptation level. Also, stimuli are weighted differently according to whether they are the focus of attention ('focal stimuli') or not ('background stimuli').

Early experience plays an important part in the establishment of adaptation levels, these stimuli being weighted more heavily because they are the first of the class of stimuli to which the organism will be exposed. If novelty is a characteristic of stimuli to which adaptation can take place, then early experience of novel and varied stimuli (enrichment conditions) sets a relatively high level of adaptation to novelty. Under standardized conditions, these organisms which had a higher adaptation level to novelty would be more likely to be deprived of novelty and to seek it out in order to reduce the tension Helson postulates accomparies its deprivation. Since all stimulation is at first novel to the infant organism, all should have some adaptation to novelty, but as adaptation to specific stimuli takes place, more and more changes must be introduced into the environment in order to provide a relatively high level of novelty. Thus, it is conceivable that reaction to an aspect of stimulation which many would assume to be a primary reinforcer might be so profoundly affected by adaptation as to raise serious doubts about any distinction.

Focal and background stimulation. Allyn and Festinger (1961) exposed two groups of high-school students to a speaker described as an "authority on driving," who delivered a scathing speech against teen-age drivers (interpreted as an attack on a popular teen-age

position). Members of one group were told to listen carefully so they could answer questions later about the speech itself; the other group was told to listen carefully so they could answer questions later about the speaker's personality. Measures of students' opinions about teenage driving showed that those asked to pay attention to the speaker's personality changed their views in his direction considerably more than those "tuned in" on the subject matter itself. The procedure seems to have employed exposure which, for one group, reduced the aversiveness of the stimulus, apparently by making it into a background stimulus. Festinger and Maccoby (1964) describe it as a process of reducing critical and evaluative verbal behavior directed toward (or in response to) the stimulus content by redirecting it toward something else while continuing exposure to the content, "If one created such a passive listener [passive re the content of the speech], it seems reasonable to expect that the persuasive communication would then have more of an impact. The listener, not able to counter-argue, would be more influenced and would be less likely to reject the communication." (p. 360).

Festinger and Maccoby (1964) accomplished the same resultant attitude change in groups of college students listening to identical recorded speeches against fraternities. Subjects showed more opinion change (in the direction of the content of the speech) when they simultaneously viewed irrelevant film than when they simultaneously viewed film of the actual speaker.

This procedure could be interpreted as a condition of exposure which influences the 'value' of a stimulus (a la Premack). Exposure

conditions which preclude response to a stimulus, as Festinger and Maccoby (1964) saw it, would be expected to acquire a meaningfulness to the individual different from a stimulus to which he had been allowed or required to respond. The paradigm used by Festinger is quite similar to the focal and background stimulation used in adaptation-level theory and agrees on the importance of both in their impact on the individual. Cognitive theory could also be of importance in the process of assigning a 'value' to stimuli in the focal position but not to stimuli in a background position.

Glenn (1967) gave typing instruction to 11 randomly selected educable retarded subjects for 40 weeks and found that not only did their speed increase, but also their language arts capabilities, spelling, composition, and handwriting speed, all improved significantly. According to the integrated learning model, the typing itself, as the task in which they were engaged, was focal in their attention, and the contents--language and spelling--were incidental (background) stimuli, yet the exposure to the contents influenced their behavior.

If the process of assigning value to focal stimuli is an automatic process, then the failure of some children to assign this value could be due to an attentional deficit--so that the stimulus was never really focal in the first place, or due to a cognitive dificit--a failure of interpretation. The possibility also exists that Benson (quoted by Premack, 1971) was using social reinforcers for the children in the experiment and obtained more responses from the average children than from the 'backward' children.

According to Helson's adaptation-level theory, a stimulus which is widely discrepant from the previously established adaptation level for that stimulus induces tension in the organism perceiving it. This reaction could be related to the orienting response (OR). The OR could be an indication that stimulation has varied from internal standards or expectations for that stimulus. The OR would also indicate the directing of attention toward a stimulus to the 'focal' position—so that it is now a focal rather than a background stimulus. This aspect of a stimulus may be of importance in its impact on the organism.

In terms of learning theory applied to reinforcement establishment, difficulty may be foreseen in presenting a stimulus to the mentally retarded as a background stimulus due to the research showing them to have a deficit in incidental learning (Cegelka, 1972). If background stimuli have much less effect on the mentally retarded, as an incidental learning deficit would imply, then a stimulus presented with a distractor might not have the adaptation-level effect anticipated. It remains to be tested whether adaptation effects occur in the mentally retarded as in the non-retarded individual. In GSR effects, Pilgrim, Miller, and Cobb (1969) found no habituation differences between normal and mentally retarded persons.

Adaptation level and mental retardation. In applying adaptation-level theory to the problem of social reinforcers in the mildly mentally retarded, their lack of responsiveness to social reinforcers implies that they have not been exposed to social praise. If they have experienced very little social praise, their adaptation level for it as a

stimulus event would be low (a low level of expectancy for it). Conditions of little social praise, while they would constitute a state of deprivation for the 'average' child, would have little effect on the child who had experienced little. Conversely, if a teacher administered social praise frequently (in the belief that it would 'motivate' these children) he would actually be drastically exceeding the adaptation level of the child for social praise and cause tension, distress, or aversion in the child. It would be expected from this model that the mildly retarded child has come from a home in which rearing methods, especially methods of discipline, differ drastically from those of the average home. The deprived home would be expected to use little positive social reinforcement and either punitive discipline or none at all.

Kamii (1965) compared maternal behavior toward four-year-old children of lower-class and upper middle-class mothers in a midwestern community. The two groups differed considerably in their socialization practices. Middle-class mothers gratified children's affectional and security needs, used bilateral influence techniques, encouraged and rewarded children for verbal behavior, and generally reinforced desirable behavior significantly more than lower-class mothers.

Hess, Shipman, and Jackson (1965) found, among Negro families in the Chicago area, that below the college-educated, professional level, all mothers behaved much alike. In general the results agree with Kamii. Upper middle-class mothers praised the child's verbal and problem-solving efforts more than did other mothers, but gave just as much criticism. In describing the information they would give a child on

his first day at school, the high-status group emphasized supportiveness, but all other groups stressed unquestioned obedience to injunctions and commands. Katz (1967) had reason to believe that lower-class punitiveness was at a higher rate than was reported, being concealed from the investigators.

Within an adaptation-level theory framework, the higher choice of the "poor," self-critical button should have been preceeded by a greater amount of criticism of the child who chose it than of the child who did not. Katz (1967) presents evidence that this is, indeed, the case, though he interprets it differently. Ausubel (1963) stresses two features of child rearing which he asserts to be typical of low-income Negro families. One is a harsh authoritarianism of parents who emphasize punitive forms of control and place considerable social and emotional distance between themselves and their children. The other feature is an early relaxation of close parental supervision, which makes the child precociously independent of adult influence but exposes him to the exaggerated socializing influence of the peer group.

Katz (1967) reports that he and Baron used the Reinforcement History Questionnaire (RHQ). They found no differences among girls, but among boys they found that, ". . . good pupils reported having uniformly more favorable experiences with parents than poor pupils, with every difference except one (positive reinforcement by mothers) being significant." These results are consistent with Sarason, Davidson, Lighthall, Waite, and Ruebush (1960) who found that the fathers, but not the mothers, of high-anxious children to be harsher in their parental

judgments than the parents of low-anxious children. Katz compared test anxiety scores with reinforcement history and self-evaluations, "All the correlations, except those involving scores on mothers' behavior, are suggestively high . . . they show clearly that low achievement, anxiety, and a propensity for self-devaluation, which are all interrelated, are each in turn related to perceptions of low parental interest and acceptance, and high parental punitiveness." (p. 170)

> To summarize the personality-deficit point of view, Ausubel and Bettelheim assume that the lower-class Negro emerges out of childhood psychologically incapable of adjusting to <u>any</u> type of organized social environment, whether white or Negro. Not only does he lack values and goals, and self-control, and the types of competence that are necessary for success in the white middle-class world, but he is equally unfitted for adequate adjustment to life in the Negro ghetto. (p. 137)

<u>School</u>. When the disadvantaged child with a background of criticism and little praise reaches school, one would expect him to be different, and the above studies show that the boys' performance can be demonstrated to correlate with his background. From the adaptation-level point of view, the child is adapted to a high level of criticism and a teacher who habitually gives praise as a positive reinforcer would find that he has failed to 'motivate' these children. Consequently, the teacher would fail to keep the child at his work and fail to get sufficient practice of school tasks, which we would expect to result in less academic progress. Assuming that teachers are reinforced by evidence of academic progress in their students, they would be expected to be frustrated by its absence and to be dissatisfied with the school situation. At the same time, the students are not only not reinforced by standard school procedures of praise, but their accustomed level of punishment

is absent in the standard school situation. They would be expected to behave in such a way as to gain an increase in the level of 'punishment' to a level to which they are adapted.

Harriott and St. John (1966) interviewed teachers and principals in urban public schools. Both principals' and teachers' replies to a series of questions indicate that the lower the school socio-economic status, the smaller the proportion of teachers who: enjoyed their work, had personal loyalty to the principal, desired to remain at their present school, had favorable opinions of the motivation and behavior of their pupils, and did not waste a lot of time in the classroom. As reported by principals only, the lower the school socio-economic status the smaller the proportion of teachers who were competent, made an effort to improve their competence, and were strongly interested in their students. Katz concludes that the Negro students are given poorer teachers, but these teachers could easily fit the assumption that they (as middle-class individuals who have experienced and are inclined to dispense praise) are frustrated by the lack of response, academically and motivationally, to their reinforcers. It is not surprising that, as Katz puts it, "Apparently, many teachers inadvertently dispense strong negative reinforcements in the form of personal disapproval and rejection, and studies of teachers' attitudes toward lower-class pupils suggest that the incidence of such teachers in predominantly Negro schools is relatively high." (p. 178)

It is as reasonable to assume that teachers themselves have reacted to and been shaped by the contingencies available from their students

as it is to assume that students have been influenced by their previous experience. There is apparently a class difference, indicating a difference in reinforcement history, between the teachers and students. The teachers are inclined, because of their history, to offer praise for desirable responses and to use criticism only as a punishment, and as seldom as possible. The students, on the other hand, are adapted to little praise and a great deal of punishment or inattention. If social praise is subject to deprivation-satiation effects, one must be deprived of it in order to increase its effect as a reinforcer. But when the child is adapted to an extremely low level of social praise, the school situation does not constitute a state of deprivation; almost any amount of praise will be above his level of adaptation, terminating deprivation and the effectiveness of social praise as a reinforcer. given the predilection of the teacher to use criticism only as a punishment (following undesirable responses), the students' adaptation to a high level of criticism, and his deprivation of it as a form of attention when he is in school, it may even be reasonable to assume that he will behave in such a way as to increase the level of criticism so that it approaches his adaptation level. Further, as in the case of underachievers, it should be tested whether social criticism might actually function as a positive reinforcer for many low socio-economic status children (in a state of deprivation for social criticism) (Van De Riet, 1964).

Zigler (1966) proposes that institutionalization deprives menatlly retarded persons of social contact, and they consequently react to

social reinforcers as if they were in a state of deprivation. But more recent research (Harter, Brown, & Zigler, 1971) has shown that on a 3-choice discrimination problem, the institutionalized mentally retarded scored higher in a 'standard' condition (without social reward) than with social reward. Noninstitutionalized mentally retarded, on the other hand, scored higher when given social reward than when in the standard condition. These results fit better with an adaptation-level approach--the institutionalized mentally retarded have been exposed to a lower level (lower frequency) of social approval in the institution, but this condition--if continued long enough--should lead to a lowered adaptation level for social approval. In effect, lower incidence of social approval should lead to less expectancy, lowering of deprivation, and less seeking of social approval.

The noninstitutionalized mentally retarded have been exposed to more social approval, have a higher adaptation level for it, expect more, and seek more. Nonretarded individuals, by their greater competence, could be expected to have experienced even greater levels of social approval. Under identical laboratory conditions of approval, the normal children would be most deprived of (and susceptible to reinforcement by) social approval, noninstitutionalized mentally retarded to a lesser degree, and institutionalized mentally retarded least. This is exactly the order of scoring obtained by Harter, Brown, and Zigler, under the social incentive condition.

The battered-child population represents a special case of children from different social class backgrounds who receive severe physical punishment. If exposure to excessive punishment from infancy has the effect anticipated from combined learning theories, a very high incidence of mental retardation would be expected among these children. This is, in fact, the case as found by Elizabeth Elmer (1967) in a follow-up study of 50 abused children. Elmer found that over half of the abused children were mentally retarded as opposed to none of a matched control group (although we cannot be sure how many were brain-damaged from the batterings). It has also been found that a great number of abusive parents were themselves abused as children. This, too, fits the learning approach.

Social Learning Theory.

". . . the term 'social learning' simply defines a category of learning that involves stimuli provided by people but that follows the same principles as nonsocial learning." (Gewirtz, 1969, p. 61). This is Gewirtz's summary of the status of social learning theory from his own operant point of view. Most social learning theorists begin with the acceptance of operant principles and then go on to emphasize some additional learning mechanism which they feel adds power to the learning theory position. Gewirtz (1969) has taken a strictly operant approach emphasizing, ". . . instrumental conditioning and S-R chaining concepts . . .," but slightly changing basic operant definitions--a conditioned reinforcer, for Gewirtz, is established by contiguous pairing with a known reinforcer (not exclusively a primary reinforcer),

and deprivation can occur in reference to any reinforcer (not just primary reinforcers). His departures are slight but significant in that separate empirical validation is required for these changed definitions. Albert Bandura (1969, a) is another social-learning theorist who relies basically on operant principles but makes his own additional emphasis on "identification" as a principle based on imitation phenomena. Aronfreed (1969) again emphasizes operant principles of conditioning and consequences but postulates an additional principle of "internalization," in which "internal monitors" develop within the child, freeing him from externally imposed contingencies but not stimuli. Social learning theory as described by Rue Cromwell (1963) also accepts basic contingencies of S-R psychology but adds his emphasis on "expectancy" in a more cognitive vein.

The theory of the establishment of reinforcement presented in this paper resembles the above social learning theories in that the basic principles of operant conditioning are accepted and additional principles of learning theory are integrated with it. The established learning theorists have chosen to add as few principles as possible and treat their effects in minute detail. An integrated theory differs from previous social learning theories in attempting to combine as many relevant principles of learning as possible, developing them into a system in which all of these principles interact with each other.

Establishment of acquired reinforcers.

We have considered the predominant theories which deal with the process by which stimuli become meaningful. Contiguity theory, including

the operant model, has demonstrated the establishment of 'secondary reinforcers' in the laboratory. The existence of secondary reinforcers may be accepted, in spite of current criticism, if the phenomenon is not assumed to explain acquired reinforcement. Operant methods establish a reinforcer (contiguously) which is relatively low in both power and permanence when primary reinforcers are withdrawn from contingent or contiguous relationship with them.

Acquired reinforcers established in compliance with the cognitive model are seen to be highly powerful as long as they can stand for powerful rewards, but lacking permanence when the rewards for which they stand are no longer available. Contiguity is not one of the requirements of this model, but contingency is.

Exposure theory requires neither contiguity nor contingency in its basic assumptions. Acquired reinforcers established by exposure do not appear to be typically powerful but are relatively permanent, relying on some (pooled) memory process rather than any understanding of contingency or contiguous pairing.

In addition, certain other principles appear to be highly relevant to a learning model. Energization of behavior is variously dealt with in the form of 'value' placed on stimuli, 'tension' aroused by departure from adaptation level, and drive. The positive or negative aspect of a reinforcer is variously determined by the valence of the primary (or known) reinforcer with which it is paired, its (cognitively) understood usefulness in obtaining a positive or avoiding a negative primary reinforcer, or its 'value' arbitrarily

assigned when it is a focal stimulus but not when it is a background stimulus.

An integrated theory of reinforcement.

Stimuli may gain the power to reinforce (1) if paired with already meaningful stimuli, (2) if they are understood to be instrumental in obtaining meaningful stimuli, (3) if they are adapted to, and (4) if they are arbitrarily assigned a value as focal stimuli.

Cognitive and contiguity theory. If a stimulus is contiguously paired with a reinforcing stimulus, it can acquire some of the properties of the reinforcer, but when the reinforcer is removed the reinforcing power rapidly diminishes. The relevant aspect removed from the situation is the cognitive aspect of contingency, or the utility of the conditioned stimulus in obtaining the primary reinforcer. But a stimulus may be a cue to reinforcement by supplying the (cognitive) aspect of meaning (telling a person that an object is valuable) without repeated contiguous pairings of the stimuli. This cognitively established meaning appears to endure only as long as the contingency or instrumental value of an object is understood to hold true. If something happens to the contingency system to make it lose its instrumental value, the loss of reinforcement value is immediate.

Many stimulus events, however, following some condition of exposure, may acquire reinforcement value in and of themselves seemingly independent of pairing with or relationships to other stimulus events. Praise, novelty, admiration, affection, and many

specific things which a person may seek to acquire, collect, or experience, are not instrumental in obtaining other reinforcers and are not (at least in the present) contiguous with other reinforcers. Since the pairing (contiguity) and cognitive strategies loose their effectiveness rapidly when contingency is withdrawn, these stimuli must have become reinforcers by some condition of exposure which results in a relatively permanent effect on the reinforcement system.

Cognitive and exposure theory. Exposure theory itself deals best with long-term reinforcing stimuli. Within adaptation-level theory, exposure to a stimulus as a focal stimulus weights it more heavily in determining the adaptation level for that stimulus event or class of events. Attitude research leads us to suspect that making a stimulus focal also allows it to be cognitively evaluated concerning its utility in relation to other reinforcers. A background stimulus is unlikely to be evaluated at all, allowing it to remain neutral or fail to become negatively evaluated. A focal stimulus may (or must) be evaluated to become positive or negative to the organism. Further exposure to a stimulus which has been assigned a value would contribute to the adaptation level for that stimulus. Once a stimulus has been assigned a value, it may be more likely to be a focal stimulus on subsequent occurrences. Change in value is a cognitive process by which a previously positively-valued stimulus becomes negatively valued because of a change in its utility or contingency. A previously negatively valued stimulus may change as a function of exposure in a context which involves the absence of the cognitively understood

contingency; this is the process of desensitization.

Procedures for establishing reinforcers.

If the stimulus event is a new one, it may be introduced as a background stimulus or as a focal stimulus with its cognitive cue value supplied. As a background stimulus, adaptation to its presence would take place without the assignment of a negative value. An adaptation level to its presence could be built up and then it could be removed, constituting a state of deprivation for that stimulus event. Its power as a potential reinforcer would not be expected to be as great as that of a stimulus event which has been focal and assigned a value.

In order to make a stimulus a background stimulus, it would in most cases be necessary to present along with it another stimulus which will command attention. This focal stimulus would act as a distractor, keeping the target stimulus from becoming focal. The problem is that by definition the focal stimulus will have some degree and direction (valence) of power as a reinforcer, and the strategy amounts to one of pairing stimuli as the operant procedure has advocated. The difference is that it is present for the purpose of distracting attention, not imparting its own power to the neutral stimulus. These conditions must be differentiated on the basis of the separate characteristics of the focal stimulus as (a) a reinforcer, and (b) a holder of attention. It may also be shown (contrary to the predictions of S-R psychology) that a distractor stimulus may be negatively valued but contribute to the building of a positive reinforcer introduced as a

background stimulus.

An event introduced as a focal stimulus along with a cue to (cognitively) determine its value might rapidly (or immediately) become a reinforcer. Its immediate value or power should be determined primarily by the power of the reinforcer which it is understood to be instrumental in obtaining, but further exposure should also cause an adaptation level to be established which imparts more permanent power in addition to the instrumental (cognitive) relationship. With continued exposure, the event could gain more independent power as a reinforcer in and of itself, and its removal might eventually cause increased tension which may be defined as a state of deprivation or an increase in drive for that stimulus, since reinstitution of that stimulus would be the primary means by which the tension may be reduced. Again, research is needed to confirm or deny the validity of the predictions based on the learning theories.

If the stimulus has been a background stimulus, it may already have some power as a reinforcer. The significant characteristic it may lack is cognitive meaning as being instrumental in obtaining another reinforcer. If a stimulus has been experienced as a background stimulus and it is arranged as a cue to reinforcement, it should rapidly become a powerful and relatively permanent reinforcer, power being imparted by the adaptation level already existing for this stimulus, as well as by the reinforcer to which it leads.

If the stimulus has been a focal stimulus, some cognitive evaluation should have already been made of it. If this evaluation is not positive it is likely to have been assigned a negative value primarily because of its focal position. To overcome this, a primarily cognitive manipulation would be necessary—making the previously negatively evaluated stimulus instrumental in obtaining a positively valued reward. Mere exposure should not change the valuation already assigned to the stimulus except in the case where it has been cognitively understood to lead to negatively valued consequences, and these consequences do not obtain.

Establishing social reinforcers.

The primary concern of this paper has been the problems specific to educable mentally retarded children in an academic environment. There is reason to believe that 'deprived' children have many abilities not made use of in their education and that their primary problem is motivational. This approach has not dealt with many other problems which deserve concern, such as genetic problems, brain damage, nutrition, culture, language development, etc. But it does cover a number of other relevant factors, including reinforcement hierarchy, development of responsiveness to reinforcers offered by the schools, particularly social reinforcers, control of disruptive behavior, and control of the practice of school-related tasks. These factors are all important to the problem of motivation as defined by an operant approach.

Although a motivational approach to the problem of mild mental retardation cannot be expected to solve all of the problems of the deprived child, it may make him more 'normal' in his responsiveness to social reinforcement. This is expected to be the biggest single factor involved in placing these children back into regular classrooms. If the teacher of a regular classroom could control and motivate these children, they would be much more acceptable as students, and the 'normal' classroom placement would further serve to expose the students to the reinforcement arrangements to which they are expected to respond.

In order to make use of the alternative methods developed from learning theories for establishing learned social reinforcers, research must be arranged to first determine the status of positive social reinforcers for the deprived child. If no exposure has taken place, the social reinforcer may be neutral, having no effect at all on the child. In this case, a careful program of exposure should be undertaken--the child must be given social praise in order for him to adapt to it. At the same time, it must be determined whether the social praise will be adapted to most efficiently if an attempt is made to make it a background stimulus (by introducing it only while another activity is in progress) or a focal stimulus (stopping activity for reinforcement). According to the theory, if the social reinforcer is made focal, the teacher must insure that it is positively evaluated by the child. This may be accomplished by carefully explaining (and/or demonstrating) that some desirable consequence may later ensue. Although it may not be possible to empirically determine what the child's focus of attention

is, the two methods, adaptation and cognitive valuation, can be compared in their effectiveness in changing the power of social reinforcers on mildly mentally retarded students.

If it is determined that positive social reinforcers have been experienced by the child, they still may have been either positively or negatively evaluated by him. The child who has already positively evaluated social praise will require esposure at a higher level of frequency than he has experienced in the past. This should raise his level of adaptation for social praise, so that sufficient exposure will itself create further need for social praise when it is absent.

It is possible that in the background of the 'deprived' child social praise has been experienced in such a way that it has been negatively evaluated as a reinforcer by the child. In this case, exposure to social reinforcers would have to be carefully arranged so as to 'desensitize' the child. Mere exposure in the absence of negative consequences would not be an adequate treatment. The child must be supplied with an explicit (re-) interpretation of the reinforcer at the same time that exposure is arranged. Also, it is not consistent to assume that a negative reinforcer can be exposed as a background stimulus, because its existing reinforcement power should command attention.

Much motivational research remains to be conducted within the reinforcement paradigm. Only preliminary research exists on the effects of background and focal presentation on the reinforcing power of a stimulus. The learning theories themselves have not been systematically applied to the question of how a reinforcer is established. They hold

many possibilities for identifying different types of learned reinforcers and different methods of establishing them.

APPENDIXES

APPENDIX A

STUDIES ON WHICH TABLE 1 IS BASED

Studies Offering No Reward

and Showing a Deficit

Berry, P. J. Comprehension of possessive and present continuous sentences by nonretarded, mildly retarded, and severely retarded children. American Journal of Mental Deficiency, 1972, 76, 540-532.

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APPENDIX B

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